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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,837	11/21/2003	Balaji Raghothaman	873.0134.U1(US)	1329
29683 7590 06/23/2009 HARRINGTON & SMITH, PC 4 RESEARCH DRIVE, Suite 202 SHELTON, CT 06484-6212				
EXAMINER				
PASIA, REDENTOR M				
ART UNIT		PAPER NUMBER		
2416				
MAIL DATE		DELIVERY MODE		
06/23/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/718,837

**Applicant(s)**

RAGHOTHAMAN ET AL.

**Examiner**

REDENTOR M. PASIA

**Art Unit**

2416

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 6-11 and 14-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-11 and 14-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

**\*\*\* Note that AU2616 has been changed to AU2416\*\*\***

***Response to Arguments***

1. Applicant's arguments, see Pre-Appeal Brief Request pages 1-5, filed 02/23/2009, with respect to the rejection(s) of claim(s) 1-4, 6-7, 9-11, 14-16, 18-23, and 25-28 as being unpatentable under 35 U.S.C. 103(a) over Ketchum, U.S. Published Patent Application No. 2003/0048856, in view of Dabak, U.S. Patent No. 6,594,473, claims 8 and 17 based on Ketchum, Dabak and Salvi and claim 24 based on Ketchum, Dabak, and Kim.) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made as shown below:

- **Claims 1-4, 7, 9-10, 21, 25 and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim).
- **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim) in further view of Kim et al. (US 7,277,407; hereinafter Kim II).
- **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim) in further view of Salvi (US 2004/0139383; hereinafter Salvi).

- **Claims 11, 14, 18-20, 24 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US 203/0128769; hereinafter Kim) in view of Hottinen et al (WO/02/47286; hereinafter Hottinen) in further view of Ketchum et al. (US 2003/0048856; hereinafter Ketchum).
- **Claims 15 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US 203/0128769; hereinafter Kim) in view of Hottinen et al (WO/02/47286; hereinafter Hottinen) in further view of Ketchum et al. (US 2003/0048856; hereinafter Ketchum) in further view of Kim et al. (US 7,277,407; hereinafter Kim II).
- **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US 203/0128769; hereinafter Kim) in view of Hottinen et al (WO/02/47286; hereinafter Hottinen) in further view of Ketchum et al. (US 2003/0048856; hereinafter Ketchum) in further view of Salvi (US 2004/0139383; hereinafter Salvi).
- **Claims 22-23 and 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim).

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 1-4, 6-10 and 25** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, **claim 1** recites the broad recitation "N<sub>1</sub> and N<sub>2</sub> are non-zero integers", and the claim also recites "one of N<sub>1</sub> and N<sub>2</sub> may be zero" which is the narrower statement of the range/limitation.
5. Additionally, **regarding claim 1**, the phrase "may be" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention.

#### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 1-4, 7, 9-10, 21, 25 and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 2003/0128769; hereinafter Kim).

**As to claim 1**, Hottinen shows a method (abstract; method shown) comprising:

encoding data signals across time into an encoded data signal (page 22, 2<sup>nd</sup> ¶; note data signals are encoded so that different encoded bits are transmitted from different beams with an assigned power. Further note that a turbo encoder is applied in the encoding process, by using the turbo encoder to the data signal, the data signal is encoded across time);

determining a quality of at least a first channel (page 12, 3<sup>rd</sup> ¶; note that the weight information, which includes sets of weights, data rates and power distribution, is determined based on short term variations (i.e. quality) of the received channels or based on stationary structure of the received channels or combination of both) from a feedback circuit (page 8, 2<sup>nd</sup> ¶; note that data rate sampling to multiple beams is done at least partially using a second radio connection unit to first radio connection unit feedback);

dividing the encoded data signal (page 22, 2<sup>nd</sup> ¶; data signals transmitted by the base station are split in the base station to multiple downlink beams after channel encoding) into a first transmission data signal and a second transmission data signal (page 22, 2<sup>nd</sup> ¶; the encoded signal is distributed in at least two beams (i.e. each data signal on each channel) for transmission. See also page 3, 3<sup>rd</sup> ¶ to page 4, 1<sup>st</sup> ¶),

wherein at least one data signals is based on the determined quality of the first channel (page 22, 2<sup>nd</sup> ¶; note that each of the two beams is formed by weighting the supplied encoded data bits in the antenna elements with the corresponding set of weights, which includes the weight information for each antenna element for the specific beam); and

transmitting in parallel the first transmission data signal (page 3, 3<sup>rd</sup> ¶; data signal is distributed to at least two beams (i.e. each data signal on each channel) for parallel transmission of the data signal in at least two partly different streams) from a first antenna (page 3, 3<sup>rd</sup> ¶; transmission of stream using at least one antenna element) at a first rate at a first power modified by a first weight value over the first channel (page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rates with which bits are to be transmitted and an output power.) and

the second transmission packet from a second antenna (page 3, 3<sup>rd</sup> ¶; other data signal distributed in another beam of the at least two beams) at a second rate that differs from the first rate and at the first power modified by a second weight value over a second channel (page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rates with which bits

are to be transmitted and an output power. Page 20, 2<sup>nd</sup> ¶; further note that different rates, R1, R2, etc. are assigned to different beams).

Hottinen shows an example of the turbo encoding process in page 22, however, does not specifically show the particular assignments of different bits and corresponding sizes.

Even though, Hottinen shows the encoded data signal, Hottinen does not specifically show a plurality of N systematic bits, an encoded packet of size M bits, a first transmission packet defining a first size M1 bits that includes N1 of the N systematic bits and a second transmission packet defining a second size M2 bits that includes N2 of the N systematic bits; wherein M, M1, M2, N, N1 and N2 are all non-zero integers except one of N~ and N2 may be zero, M is greater than N, M is at least equal to M1+M2, and N is at least equal to N1+N2.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Kim. Kim shows a method for providing first and second interleaved bit streams to a modulator in order to transmit the first and second interleaved bit streams through at least two antennas in a mobile communication system (abstract).

Specifically, Kim shows a plurality of N systematic bits (Par. 0036; prior to input to encoder, there are 3 input information bits; see related Figure 8, step 140-142), an encoded packet of size M bits (Par. 0056; note that after encoding process, for a given channel encoder generates a packet with 3 systematic bits and 1 parity bits; see related Figure 8, step 142)

a first transmission packet defining a first size M1 bits that includes N1 of the N systematic bits (Par. 0056; note when 4 transmission antennas have a transmission condition pattern [H, M, M, L], the systematic bits are transmitted through transmission antennas with transmission conditions H, M and M, and the 1 parity bit is transmitted through a transmission



antenna with a transmission condition L. In this instance, under H transmission condition, a systematic bit (i.e. one of  $N_1$ ) is transmitted, where the size is also dictated by the systematic bit; see related Figure 8) and

a second transmission packet defining a second size  $M_2$  bits that includes  $N_2$  of the  $N$  systematic bits (Par. 0056; note when 4 transmission antennas have a transmission condition pattern [H, M, M, L], the systematic bits are transmitted through transmission antennas with transmission conditions H, M and M, and the 1 parity bit is transmitted through a transmission antenna with a transmission condition L. In this instance, under any of M transmission conditions, a systematic bit (i.e. one of  $N_2$ ) is transmitted, where the size is also dictated by the systematic bit; see related Figure 8);

wherein  $M$ ,  $M_1$ ,  $M_2$ ,  $N$ ,  $N_1$  and  $N_2$  are all non-zero integers (Par. 0054-0056; systematic bits and given corresponding sizes (i.e.  $M$ ,  $M_1$ ,  $M_2$ ) are non-zero integers)

except one of  $N_1$  and  $N_2$  may be zero (Par. 0054; note under transmission condition [H,x,x,L], all the systematic bits are transmitted under the H transmission condition, and none (i.e. one of  $N_1$  or  $N_2$ ) of systematic bits are transmitted in the L transmission condition),

$M$  is greater than  $N$  (Par. 0056; note that output of 3 systematic bits and 1 parity bit (i.e. combination shows  $M$ ) is greater than 3 input information bits (i.e.  $N$ )),

$M$  is at least equal to  $M_1+M_2$  (Par. 0054-0056; note that the total systematic bit size is equal to the distributed systematic bit size (in different streams).), and

$N$  is at least equal to  $N_1+N_2$  (Par. 0054-0056; note that the total systematic bits are equal to the distributed systematic bits (in different streams).).

In view of the above, having the system of Hottinen, then given the well-established teaching of Kim, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Hottinen as taught by Kim, in order to improve system performance by assigning the systematic bits to the bits corresponding to positions more resistive to an error among the bits constituting a symbol and assigning the parity bits to the bits corresponding to positions relatively susceptible to an error, during modulation (Par. 0017).

**As to claim 2**, modified Hottinen shows wherein dividing the encoded packet comprises maximizing a number  $N_1$  of systematic bits in the first transmission packet (Kim: Par. 0054; note that during transmission condition  $[H, x, x, L]$ , systematic bits are maximized in under the transmission condition H).

**As to claim 3**, modified Hottinen shows wherein  $N=N_1$  and  $N_2=0$  (Kim: Par. 0054; note that during transmission condition  $[H, x, x, L]$ , systematic bits are maximized in under the transmission condition H; Table 1, Par. 0052; shows a coding rate of  $1/2$ , where for a given input of 1 information bit, 1 systematic bit and 1 parity bit is output out of the encoder. Thus in this instance, when a coding rate of  $1/2$  is applied to the transmission condition of  $[H, x, x, L]$ , 1 systematic bit is transmitted on the H condition, thus denoting  $N=N_1$ , and  $N_2=0$ ).

**As to claim 4**, modified Hottinen shows wherein  $M_1=M_2$  and  $N_1 \neq N_2$  (Kim: Par. 0054; note that during transmission condition  $[H, x, x, L]$ , systematic bits are maximized in under the transmission condition H; Table 1, Par. 0052; shows a coding rate of  $1/2$ , where for a given input of 1 information bit, 1 systematic bit and 1 parity bit is output out of the encoder. Thus in this instance, when a coding rate of  $1/2$  is applied to the transmission condition of  $[H, x, x, L]$ , 1 systematic bit is transmitted on the H condition, thus denoting  $N_1 \neq N_2$  and since 2 bits (one

systematic under H condition; one parity under L condition) is transmitted, the transmission also shows  $M1=M2$ ).

**As to claim 7**, modified Hottinen shows encoding a plurality of N systematic bits across time into an encoded packet of size M bits comprises interleaving over the M bits (Kim: abstract, Figure1; note interleaver interleaves the first and second bit streams into the first and second interleaved bit streams).

**As to claim 9**, modified Hottinen shows determining a capacity of said first channel (Kim: Par. 0093; note that Information representing transmission conditions for the transmission antennas is generated by Water pouring. This means that the transmitter and the receiver both perceive the channel conditions. Based on the information, the transmitter can perform an operation of increasing channel capacity.).

**As to claim 10**, modified Hottinen shows determining a quality of a second channel (Kim: Par. 0021; note that transmission conditions of antennas are determined), and the values of M1 and M2 are determined from the quality of the first and second channels (Kim: 0021; note that the values of the included bits and corresponding size (i.e. M1, M2) for transmission on a given antenna is based on the transmission conditions of the antennas (i.e. [H,x,x,L] or [H,M,M,L], etc)).

**As to claim 21**, Hottinen shows a method (abstract; method shown) comprising:  
encoding data signals (page 22, 2<sup>nd</sup> ¶; note data signals are encoded so that different encoded bits are transmitted from different beams with an assigned power);

based on a determined characteristic of at least a first channel (page 12, 3<sup>rd</sup> ¶; note that the weight information, which includes sets of weights, data rates and power distribution, is

determined based on short term variations (i.e. quality) of the received channels or based on stationary structure of the received channels or combination of both), adaptively splitting the encoded input bits into a first stream and a second stream (page 22, 2<sup>nd</sup> ¶; data signals transmitted by the base station are split in the base station to multiple downlink beams after channel encoding so that different encoded bits are transmitted from different beams); and

transmitting the first stream (page 3, 3<sup>rd</sup> ¶; data signal is distributed to at least two beams (i.e. each data signal on each channel) for parallel transmission of the data signal in at least two partly different streams) at a first rate and at a first power modified by a first weight value over the first channel (page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rate with which bits are to be transmitted and an output power.) and

the second stream (page 3, 3<sup>rd</sup> ¶; other data signal distributed in another beam of the at least two beams) at a second rate that differs from the first rate and at the first power modified by a second weight value over a second channel (page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rates with which bits are to be transmitted and an output power. Page 20, 2<sup>nd</sup> ¶; further note that different rates, R1, R2, etc. are assigned to different beams).

Even though, Hottinen shows the encoded data signal, Hottinen does not specifically show a plurality of input bits; a first subpacket defining a first subpacket size and a second subpacket defining a second subpacket size.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Kim. Kim shows a method for providing first and second interleaved bit streams to a modulator in order to transmit the first and second interleaved bit streams through at least two antennas in a mobile communication system (abstract).

Specifically, Kim shows a plurality of N systematic bits (Par. 0036; prior to input to encoder, there are 3 input information bits; see related Figure 8, step 140-142);

a first subpacket defining a first subpacket size (Par. 0056; note when 4 transmission antennas have a transmission condition pattern [H, M, M, L], the systematic bits are transmitted through transmission antennas with transmission conditions H, M and M, and the 1 parity bit is transmitted through a transmission antenna with a transmission condition L. In this instance, under H transmission condition, a systematic bit (i.e. one of N1) is transmitted, where the size is also dictated by the systematic bit; see related Figure 8)

and a second subpacket defining a second subpacket size (Par. 0056; note when 4 transmission antennas have a transmission condition pattern [H, M, M, L], the systematic bits are transmitted through transmission antennas with transmission conditions H, M and M, and the 1 parity bit is transmitted through a transmission antenna with a transmission condition L. In this instance, under any of M transmission conditions, a systematic bit (i.e. one of N2) is transmitted, where the size is also dictated by the systematic bit; see related Figure 8);

In view of the above, having the system of Hottinen, then given the well-established teaching of Kim, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Hottinen as taught by Kim, in order to improve system performance by assigning the systematic bits to the bits corresponding to positions more resistive

to an error among the bits constituting a symbol and assigning the parity bits to the bits corresponding to positions relatively susceptible to an error, during modulation (Par. 0017).

**As to claim 25**, modified Hottinen shows channel interleaving the encoded packet of size M bits with other encoded packets (Kim: Figure 3 shows interleaver 64 which performs interleaving of systematic and parity bits); and wherein dividing the encoded packet is after the channel interleaving (Kim: Figure 3 shows dividing/distribution is performed after interleaving).

**As to claim 27**, modified Hottinen shows channel interleaving the encoded input bits with other encoded packets prior to adaptively splitting the encoded input bits (Kim: Figure 3 shows interleaver 64 disposed between encoder 60 and distributor 66, where interleaver interleaves the systematic bits and the parity bits prior to input to distributor 66).

9. **Claims 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim) in further view of Kim et al. (US 7,277,407; hereinafter Kim II).

**As to claim 6**, modified Hottinen shows transmitting the second transmission packet from the second antenna and from the first antenna and the application of different sets of weights to the streams, as discussed above. However, modified Hottinen does not specifically show transmission at a second power modified by a third weight value at a given antenna, and from another antenna at the second power modified by a fourth weight value.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Kim II. Specifically, Kim II shows transmission at a second power modified by a third weight value at a given antenna (Figure 8;  $W_{21}$  applied to transmission on antenna 1), and

from another antenna at the second power modified by a fourth weight value (Figure 8, note  $W_{22}$  applied to transmission on antenna 2; further note that the application of different weights are directly related to the power control for a given transmission on the antennas as shown at least in col. 2, lines 36-49).

In view of the above, having the system of modified Hottinen, then given the well-established teaching of Kim II, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of modified Hottinen as taught by Kim II, in order to provide proper control of a transmit antenna array for a given communications network (col. 5, lines 18-20).

10. **Claims 8 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim) in further view of Salvi (US 2004/0139383; hereinafter Salvi).

**As to claim 8**, modified Hottinen shows the step of interleaving over the M bits (Figure 4a-b).

Modified Hottinen does not specifically show that the encoding further comprises turbo encoding using a single turbo interleaver of size N.

However, the above-mentioned claim limitation is well-established in the art as evidenced by Salvi. Salvi shows turbo encoding using a single turbo interleaver (Figure 2, interleaver) of size N (Table 1, Par. 0048; Par. 0040-0043).

In view of the above, having the system of modified Hottinen and then given the well-established teaching of Salvi, it would have been obvious to one of ordinary skill in the art at the

time of the invention to modify the system of modified Hottinen as taught by Salvi in order to shorten delays in coding data (Par. 0010).

11. **Claims 11, 14, 18-20, 24 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US 203/0128769; hereinafter Kim) in view of Hottinen et al (WO/02/47286; hereinafter Hottinen) in further view of Ketchum et al. (US 2003/0048856; hereinafter Ketchum).

**As to claim 11**, Kim shows a device (Figure 1 and 3 shows a transmitting device) comprising:

an encoder (Figure 1, encoder 10; Figure 3; encoder 60) having an input for receiving a plurality of N systematic bits and an output for outputting a plurality of M bits (Par. 0052; for a given coding rate of  $\frac{3}{4}$ , the encoder has an input of 3 information bits (i.e. N systematic bits) and output of 4 systematic bits (i.e. M bits).),

wherein M is greater than N (Par. 0052; output of 4 systematic bits is greater than 3 input bits);

determining a channel characteristic of a first communication channel (Par. 0021; Par. 0071; a transmission condition of the transmission/reception antennas (for a given channel) may be determined).

a demultiplexer (Figure 3, distributor 66) having an input coupled to an output of the encoder (Figure 3, shows input of distributor 66 coupled to output of channel encoder 60) and an input coupled to an output of a controller circuit (Figure 3, shows input of distributor is also



couple to output of controller; Par. 0071, 0078; note controller changes transmission data according to transmission condition supplied in feedback),

said demultiplexer for outputting in parallel a first portion M1 of the M bits at a first output and a second portion M2 of the M bits at a second output (figure 3, distributor 66 outputs in parallel symbolic bits for antenna 1 (i.e. first portion M1 of M bits), symbolic bits for antenna 2 (i.e. second portion M2 of M bits) and so on.) ;

a first antenna coupled to the first output (Figure 3, antenna 22 coupled to an output of distributor 66) for transmitting said first portion M1 of the M bits (Figure 3; transmission of S/P/S&P for antenna 22);

a second antenna coupled to the second output Figure 3, antenna 23 coupled to another output of distributor 66) for transmitting said second portion M2 of the M bits (Figure 3; transmission of S/P/S&P for antenna 24); and

Kim does not specifically show a channel feedback circuit; a first amplifier coupled to said first output for increasing a power of said first portion M1 of the M bits; a second amplifier coupled to said second output for increasing a power of said second portion M2 of the M bits; transmitting at a first rate; transmitting, at a second rate that differs from the first rate, a first eigenvector block in series with the first output, said first eigenvector block coupled to said first and said second antenna for applying a first power weight factor to said first portion M1 of the M bits prior to transmission from said first antenna and for applying a second power weight factor to said first portion M1 of the M bits prior to transmission from said second antenna.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Hottinen.

Specifically, Hottinen shows a channel feedback circuit (page 8, 2<sup>nd</sup> ¶; note that data rate sampling to multiple beams is done at least partially using a second radio connection unit to first radio connection unit feedback);

transmitting at a first rate (page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rate with which bits are to be transmitted and an output power.);

transmitting, at a second rate that differs from the first rate (page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rates with which bits are to be transmitted and an output power. Page 20, 2<sup>nd</sup> ¶; further note that different rates, R1, R2, etc. are assigned to different beams),

eigenanalysis for applying a first power weight factor to said first portion M1 of the M bits prior to transmission from said first antenna and for applying a second power weight factor to said first portion M1 of the M bits prior to transmission from said second antenna (page 23, 2<sup>nd</sup> ¶ to page 24, 3<sup>rd</sup> ¶; note the eigenvectors determined by the eigenanalysis are fed back to the base station as sets of weights for downlink beamforming; for obtaining the weight vectors needed for beam forming, the terminal calculates two different vectors from this matrix R, e.g. the eigenvectors corresponding to the two largest eigenvalues of the matrix.

In view of the above, having the system of Kim, then given the well-established teaching of Hottinen, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Kim as taught by Hottinen, in order to allow high data rates in the downlink matched to the current channel conditions (page 3, 2<sup>nd</sup> ¶).

Even though, modified Kim shows the eigenanalysis as discussed above, modified Kim does not show a first eigenvector block in series with the first output, said first eigenvector block coupled to said first and said second antenna. Also, modified Kim does not show a first amplifier coupled to said first output for increasing a power of said first portion M1 of the M bits; a second amplifier coupled to said second output for increasing a power of said second portion M2 of the M bits.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Ketchum.

Specifically, Ketchum shows a first eigenvector block in series with the first output, said first eigenvector block coupled to said first and said second antenna (Par. 0110,  $e_{ij}$  are elements of eigenvector matrix E; Par. 0106-0113, shows equation 27, that comprises of 3 matrices, one matrix shows  $b_1 \dots b_{Nc}$  which are the weighted modulation symbols for spatial subchannels 1,2,... $N_{Nc}$ , second matrix shows  $e_{ij}$  which are the elements of eigenvector matrix E related to the transmission characteristics and are also take into account in determining effective channel gains  $H(j,k)$  and third matrix,  $x_1 \dots x_{NT}$  which shows the precondition modulation symbols; Par. 0111, shows the multiple preconditioned modulation symbols, transmitted on the channels available and modified by the eigenvector elements).

Also, Ketchum shows a first amplifier (Figure 4a-b, modulator 322a-t) coupled to said first output for increasing a power of said first portion M1 of the M bits (Par. 0104; each modulator further amplifies a modulation symbol);

a second amplifier (Figure 4a-b, modulator 322a-t) coupled to said second output for increasing a power of said second portion M2 of the M bits (Par. 0104; each modulator further amplifies a modulation symbol).

In view of the above, having the system of modified Kim, then given the well-established teaching of Ketchum, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of modified Kim as taught by Ketchum, in order to effectively and efficiently process data for transmission on multiple channels with different capacities (Par. 0007).

**As to claim 14**, further modified Kim shows wherein said first and second power weight factor are based on at least one of a size of said first M1 and second M2 portion and

a channel quality of a first and second channel provided by said channel feedback circuit (Hottinen: page 12, 3<sup>rd</sup> ¶; note that the weight information, which includes sets of weights, data rates and power distribution, is determined based on short term variations (i.e. quality) of the received channels or based on stationary structure of the received channels or combination of both; page 8, 2<sup>nd</sup> ¶; note that data rate sampling to multiple beams is done at least partially using a second radio connection unit to first radio connection unit feedback),

said first antenna transmitting over said first channel and said second antenna transmitting over said second channel.

**As to claim 18**, further modified Kim shows wherein the first M1 and second M2 portion are the same size and the systematic bits are not equally distributed among the first M1 and second M2 portion (Kim: Par. 0054; note that during transmission condition [H,x,x,L], systematic bits are maximized in under the transmission condition H; Table 1, Par. 0052; shows

a coding rate of  $1/2$ , where for a given input of 1 information bit, 1 systematic bit and 1 parity bit is output out of the encoder. Thus in this instance, when a coding rate of  $1/2$  is applied to the transmission condition of  $[H,x,x,L]$ , 1 systematic bit is transmitted on the H condition, thus denoting  $N1 \neq N2$  and since 2 bits (one systematic under H condition; one parity under L condition) is transmitted, the transmission also shows  $M1=M2$ ).

**As to claim 19**, further modified Kim said demultiplexer operates to maximize a number of systematic bits in the first portion M1 (Kim: Par. 0054; note that during transmission condition  $[H,x,x,L]$ , systematic bits are maximized in under the transmission condition H).

**As to claim 20**, further modified Kim shows a first subpacket selector (Kim: Figure 3, modulator 68) having an input coupled to the first output of the demultiplexer (Kim: Figure 3; note input of modulator 68 is coupled to output of demultiplexer),

an input coupled to an output of the feedback circuit (Kim: Figure 3, input of modulator coupled to output of controller which provides feedback information; Hottinen: page 8, 2<sup>nd</sup> ¶; note that data rate sampling to multiple beams is done at least partially using a second radio connection unit to first radio connection unit feedback),

and an output coupled to the first antenna (Kim: Figure 3; note output of modulator of 68 coupled to antennas 22-28),

said first subpacket selector for selecting and combining, into a first transmission packet that is transmitted over the first channel, the first portion M1 and at least one additional subpacket from the first output of the demultiplexer (Kim: Figure 3 and Figure 8, steps 150-156; note the modulator 68 selects and multiplexes systematic bits which are output from distributor 66; upon multiplexing/modulating, the systematic bits are transmitted on respective antennas),

wherein a size of said first transmission packet is determined at least in part based on the output of channel feedback circuit (Kim: Par. 0054-0056; note the transmission of systematic bits and parity bits, each having a respective size depending on specified coding rate, are based on transmission channels condition supplied as a feedback through the controller).

**As to claim 24**, further modified Kim shows wherein the at least one additional subpacket comprises only parity bits (Kim: Par. 0054-0056; note that depending on the coding rate and the transmission channel condition, one transmission stream may include only parity bits).

**As to claim 26**, further modified Kim shows a channel interleaver disposed between the encoder and the demultiplexer and adapted to channel interleave the encoded packet of size M bits with other encoded packets (Kim: Figure 3 shows interleaver 64 disposed between encoder 60 and distributor 66, where interleaver interleaves the systematic bits and the parity bits after encoding).

12. **Claims 15 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US 203/0128769; hereinafter Kim) in view of Hottinen et al (WO/02/47286; hereinafter Hottinen) in further view of Ketchum et al. (US 2003/0048856; hereinafter Ketchum) in further view of Kim et al. (US 7,277,407; hereinafter Kim II).

**As to claim 15**, further modified Kim shows a second eigenvector block in series with the second output (Ketchum: Par. 0106-0113, shows equation 27, that comprises of 3 matrices, one matrix shows  $b_1 \dots b_{Nc}$  which are the weighted modulation symbols for spatial subchannels 1,2,...,N<sub>Nc</sub>, second matrix shows  $e_{ij}$  which are the elements of eigenvector matrix E related to the

transmission characteristics and are also take into account in determining effective channel gains  $H(j,k)$  and third matrix,  $x \ 1 \dots XNT$  which shows the precondition modulation symbols; Par. 0111, shows the multiple preconditioned modulation symbols, transmitted on the channels available and modified by the eigenvector elements),

said second eigenvector block coupled to said first and said second antenna for applying a weight factor to said second portion M2 of the M bits prior to transmission from said second antenna and for applying a weight factor to said second portion M2 of the M bits prior to transmission from said first antenna (Hottinen: page 23, 2<sup>nd</sup> ¶ to page 24, 3<sup>rd</sup> ¶; note the eigenanalysis shows that the eigenvectors determined by the eigenanalysis are fed back to the base station as sets of weights for downlink beamforming; for obtaining the weight vectors needed for beam forming, the terminal calculates two different vectors from this matrix R, e.g. the eigenvectors corresponding to the two largest eigenvalues of the matrix.).

However, further modified Kim does not specifically show transmission at a second power modified by a third weight value at a given antenna, and from another antenna at the second power modified by a fourth weight value.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Kim II. Specifically, Kim II shows transmission at a second power modified by a third weight value at a given antenna (Figure 8;  $W_{21}$  applied to transmission on antenna 1), and from another antenna at the second power modified by a fourth weight value (Figure 8, note  $W_{22}$  applied to transmission on antenna 2; further note that the application of different weights are directly related to the power control for a given transmission on the antennas as shown at least in col. 2, lines 36-49).

In view of the above, having the system of further modified Kim, then given the well-established teaching of Kim II, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of further modified Kim as taught by Kim II, in order to provide proper control of a transmit antenna array for a given communications network (col. 5, lines 18-20).

**As to claim 16**, further modified Kim shows wherein said third and fourth power weight factors are based on at least one of a size of said first M1 and second M2 portion and

a channel quality of a first and second channel provided by said channel feedback circuit (Hottinen: page 12, 3<sup>rd</sup> ¶; note that the weight information, which includes sets of weights, data rates and power distribution, is determined based on short term variations (i.e. quality) of the received channels or based on stationary structure of the received channels or combination of both; page 8, 2<sup>nd</sup> ¶; note that data rate sampling to multiple beams is done at least partially using a second radio connection unit to first radio connection unit feedback),

said first antenna transmitting over said first channel and said second antenna transmitting over said second channel.

13. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US 203/0128769; hereinafter Kim) in view of Hottinen et al (WO/02/47286; hereinafter Hottinen) in further view of Ketchum et al. (US 2003/0048856; hereinafter Ketchum) in further view of Salvi (US 2004/0139383; hereinafter Salvi).



**As to claim 17**, further modified Hottinen shows the transmitter further comprising a channel interleaver of length M having an input coupled to the output of the encoder (Kim: Figure 3).

Modified Hottinen does not specifically show said encoder comprises an interleaver of length N.

However, the above-mentioned claim limitation is well-established in the art as evidenced by Salvi. Salvi shows said encoder comprises an interleaver of length N (Figure 2, interleaver) of size N (Table 1, Par. 0048; Par. 0040-0043).

In view of the above, having the system of further modified Kim and then given the well-established teaching of Salvi, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of further modified Kim as taught by Salvi in order to shorten delays in coding data (Par. 0010).

14. **Claims 22-23 and 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (WO/02/47286; hereinafter Hottinen) in view of Kim et al. (US 203/0128769; hereinafter Kim).

**As to claim 22**, Kim shows an apparatus (Figure 3, transmitting device) comprising:  
an encoder to encode a plurality of input bits (Figure 3; Par. 0052; shows channel encoder 60 encoding information bits);

a demultiplexer (Figure 3; distributor 66), having an input coupled to an output of the encoder (Figure 3, distributor 66 shows an input coupled to an output of encoder 60), to adaptively split the encoded plurality of bits into a first subpacket defining a first subpacket size

and a second subpacket defining a second subpacket size (Figure 3; Par. 0054-0056; distributor 66 divides input symbolic/parity bits and assigns each symbolic/parity bit for each antenna; distributor 66 outputs in parallel symbolic bits for antenna 1 (i.e. first portion M1 of M bits), symbolic bits for antenna 2 (i.e. second portion M2 of M bits) and so on; where each symbolic bit grouping has specific size based on coding rate and feedback information.);

a first antenna coupled to an output of the demultiplexer (Figure 3, antenna 22 coupled to output of distributor 66), to transmit the first subpacket over a first channel (Figure 3, antenna 22-28 are supplied for transmission over channels); and

a second antenna coupled to an output of the demultiplexer (Figure 3, antenna 24 coupled to output of distributor 66), to transmit the second subpacket over a second channel (Figure 3, antenna 22-28 are supplied for transmission over channels).

Kim does not show transmission a first rate and at a first power modified by a first weight value and at a second rate that differs from the first rate and at the first power modified by a second weight value.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Hottinen.

Specifically, Hottinen shows transmission a first rate and at a first power modified by a first weight value (page 3, 3<sup>rd</sup> ¶; data signal is distributed to at least two beams (i.e. each data signal on each channel) for parallel transmission of the data signal in at least two partly different streams; page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rates with which bits are to be transmitted and an output power.) and

at a second rate that differs from the first rate and at the first power modified by a second weight value (page 3, 3<sup>rd</sup> ¶; other data signal distributed in another beam of the at least two beams; page 17, 2<sup>nd</sup> ¶; note that beams are formed by assigning different sets of weights to the data signals for transmission from the antenna element; each beam is also assigned a data rates with which bits are to be transmitted and an output power. Page 20, 2<sup>nd</sup> ¶; further note that different rates, R1, R2, etc. are assigned to different beams).

In view of the above, having the system of Kim, then given the well-established teaching of Hottinen, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Kim as taught by Hottinen, in order to allow high data rates in the downlink matched to the current channel conditions (page 3, 2<sup>nd</sup> ¶).

**As to claim 23**, modified Kim shows a channel feedback circuit (Hottinen: page 8, 2<sup>nd</sup> ¶; note that data rate sampling to multiple beams is done at least partially using a second radio connection unit to first radio connection unit feedback; Kim: Par. 0021; Par. 0071; a transmission condition of the transmission/reception antennas (for a given channel) may be determined),

having an output coupled to an input of the demultiplexer (Kim: Figure 3; controller, which supplies the feedback information, is coupled to the input of the distributor 66), to provide a channel characteristic of at least the first channel by which the demultiplexer adaptively splits the encoded plurality of bits (Kim: Figure 3, shows input of distributor is also couple to output of controller; Par. 0071, 0078; note controller changes transmission data according to transmission condition supplied in feedback).

**As to claim 28**, modified Kim shows a channel interleaver disposed between the encoder and the demultiplexer and adapted to channel interleave the encoded plurality of input bits with

other encoded packets (Kim: Figure 3 shows interleaver 64 disposed between encoder 60 and distributor 66, where interleaver interleaves the systematic bits and the parity bits after encoding).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to REDENTOR M. PASIA whose telephone number is (571)272-9745. The examiner can normally be reached on M-F 7:00am to 3:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Aung Moe can be reached on (571)272-7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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